


## Brief Biodata

**Name: Dr. Pankaj Kumar**

<b>Designation:</b>	Principal Scientist	
<b>DP No. and Name:</b>	Photovoltaics Metrology Section (DP # 4.01)	
<b>DU No. and Name:</b>	Advanced Materials and Devices Metrology Division (DU # 4)	
<b>Email:</b>	pankaj@nplindia.org	
<b>Date of Joining CSIR-NPL:</b>	22 <sup>nd</sup> Dec. 2006	
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### Research Area/ Interest

**Organic Electronics:** Organic Light Emitting Diodes, Organic Solar Cells, Dye Sensitized Solar Cells

**Perovskite Electronics:** Perovskite Solar Cells, Perovskite Light Emitting Diodes

Understanding of device physics, charge transport phenomenon, degradation mechanisms, regeneration and encapsulation of rigid as well as flexible Organic and Perovskite Electronic Devices, towards their high performance and commercial viability.

Other areas of interest are PV metrology, PV module testing and calibration.

### Educational Qualifications

*(Please write latest qualification first)*

Degree	Subject	University/ Institute	Year
Ph. D.	Organic Semiconductors	University of Delhi	2010
M.Sc.	Physics	Meerut University	2003
B. Sc.	Physics, Chemistry, Maths	Meerut University	2001

### Academic / Research Experience

Grade / Post	Institute	Duration		Research Field
		From	To	
Principal Scientist	CSIR-NPL	2017	Till date	Organic and Perovskite Photovoltaics
Associate Professor	AcSIR-NPL	2017	Till Date	Teaching
Research Associate	University of Newcastle, Australia	2019	2021	Organic Photovoltaics and Biosensors
Senior Scientist	CSIR-NPL	2013	2017	Organic and Perovskite Photovoltaics
Visiting Fellow	University of Newcastle, Australia	2013	2014	Organic Photovoltaics
Assistant Professor	AcSIR-NPL	2011	2017	Teaching
Scientist	CSIR-NPL	2009	2013	Organic Photovoltaics
Junior Scientist	CSIR-NPL	2006	2009	Organic Light Emitting Diodes

## No. of Publications

No. of Publications in SCI Journals	No. of Publications in non-SCI Journals	No. of Publications in Conference Proceedings	Book chapters	Books	Total
61	-	29	3	1	94

## Selected Publications

- [1]. P. Kumar, A. K. Chauhan, *Highly efficient flexible perovskite solar cells and their photo-stability*, J. Phys. D: Appl. Phys. 53 (2019) 035101.
- [2]. A. K. Chauhan, P. Kumar, *Photo-stability of perovskite solar cells with Cu electrode*, J. Mater. Sci.: Mater. Electron. 30 (2019) 9582-9592.
- [3]. A. K. Chauhan, P. Kumar, *Degradation in perovskite solar cells stored in different environmental conditions*, J. Phys. D.: Appl. Phys. 50 (2017) 325105.
- [4]. P. Kumar, C. Bilen, B. Vaughan, X. Zhou, P. C. Dastoor, W. J. Belcher, *Comparing the degradation of organic photovoltaic devices under ISOS testing protocol*, Sol. Energy Mater. Sol. Cells, 149 (2016) 179.
- [5]. N. P. Holmes, M. Marks, P. Kumar, R. Kroon, M. Barr, K. Feron et al. *Nano-pathways: Bridging the Divide between Water-Processable Nanoparticulate and Bulk Heterojunction Organic Photovoltaics*, Nano Energy 19, 495 (2016).
- [6]. M. J. Griffith, M. S. Willis, P. Kumar, J. L. Holdsworth, H. Bezuidenhout, X. Zhou, W. Belcher, P. C. Dastoor, *Activation of Organic Photovoltaic Light Detectors Using Bend Leakage from Optical Fibers*, ACS Appl. Mater. Interfaces **8** (2016) 7928.
- [7]. P. Kumar, C. Bilen, K. Feron, N. Nicolaidis, B. B. Gong, X. Zhou, W. J. Belcher, P. C. Dastoor, *Comparative degradation and regeneration of polymer solar cells with different cathodes*; ACS Appl. Mater. Inter. 6, 5281 (2014).
- [8]. N. Nicolaidis, B. Vaughan, C. J. Mulligan, G. Bryant, T. Ziggler, **P. Kumar** et al. *Solution processable interface materials for nanoparticulate organic photovoltaic devices*; Appl. Phys. Lett. **104**, 43902 (2014).
- [9]. P. Kumar, C. Bilen, K. Feron, X. Zhou, W. J. Belcher, P. C. Dastoor, *Enhanced regeneration of degraded polymer solar cells by thermal annealing*; Appl. Phys. Lett. 104, 193905 (2014).
- [10]. P. Kumar, A. Gaur, *Model for the J-V characteristics of degraded polymer solar cells*, J. Appl. Phys. 113, 94505 (2013).
- [11]. A. Gaur, P. Kumar, *An improved circuit model for polymer solar cells*, Prog. Photovolt.: Res. Appl. 22, 937 (2014).
- [12]. P. Kumar, A. Sharma, D. P. Singh, *Effect of voltage sweep direction on the performance evaluation of P3HT:PCBM solar cells*; Prog. Photovolt: Res. Appl. 21, 950 (2013).
- [13]. P. Kumar, S. Chand; *Recent progress and future aspects of organic solar cells*; Prog. Photovolt: Res. Appl. 20, 377 (2012).
- [14]. P. Kumar, S. C. Jain, H. Kumar, S. Chand and V. Kumar; *Effect of illumination intensity and temperature on open circuit voltage in organic solar cells*; Appl. Phys. Lett. 94, 183505 (2009).
- [15]. P. Kumar, S. C. Jain, V. Kumar, S. Chand, R. P. Tandon; *A model for J-V characteristics of P3HT:PCBM solar cells*; J. Appl. Phys. 105, 104507 (2009).
- [16]. P. Kumar, S. C. Jain, V. Kumar, S. Chand and R. P. Tandon; *A model for current-voltage characteristics of organic bulk-heterojunction solar cells*; J. Phys. D: Appl. Phys. 42, 55102 (2009).
- [17]. H. Kumar, P. Kumar, N. Chaudhary, R. Bhardwaj, S. Chand, S. C. Jain and V. Kumar; *Effect of temperature on the performance of CuPc/C<sub>60</sub> photovoltaic device*; J. Phys. D: Appl. Phys. 42, 15102 (2009).

- [18]. H. Kumar, P. Kumar, R. Bhardwaj, G. D. Sharma, S. Chand, S. C. Jain and V. Kumar; *Broad spectral sensitivity and improved efficiency in CuPc/Sub-Pc organic photovoltaic devices*; J. Phys. D: Appl. Phys. 42, 15103 (2009).
- [19]. P. Kumar, S. C. Jain, V. Kumar, A. Misra, S. Chand, M. N. Kamalasanan; *Current-voltage characteristics of an organic diode: Revisited*, Synth. Met. 157, 905 (2007).
- [20]. A. Jain, P. Kumar, S. C. Jain, V. Kumar R. Kaur R. M. Mehra; *Trap filled limit voltage  $V_{TFL}$  and  $V^2$  law in space charge limited currents*, J. Appl. Phys. 102, (2007) 94505.
- [21]. P. Kumar, S. Chand, S. Dwivedi, M. N. Kamalasanan; *Effect of interface layer, curing temperature and polarization on the hole transport in poly(3-hexylthiophene) thin films*, Appl. Phys. Lett. 90, 23501 (2007).
- [22]. A Misra, P Kumar, MN Kamalasanan, S Chandra; *White organic LEDs and their recent advancements*, Semiconductor Science and Technology 21, R35-R47 (2006).

### **Current Activities**

*(Not more than 100 words)*

Dr. Pankaj Kumar is currently engaged in the development of printable flexible organic and perovskite electronic devices, in particularly the solar cells. Organic and perovskite electronic devices are quite futuristic and will play a big role in future energy generation and energy conservation therefore Dr. Kumar aims to make these devices commercially viable so that they could serve the society in a better way. Dr. Kumar is doing research in all the aspects related to technology development like device efficiency, durability and cost. Dr. Kumar initiated development of these devices on small area plastic substrates and has already made an appreciable progress in the field, which is reflected in his research publications. Dr. Kumar's research publications are being read and cited worldwide. He now aims to develop these technologies via roll to roll printing using conventional printing techniques and he has already make a move in that direction.

### **Honour(s)/Award(s)/ Fellowship(s)**

- **2020** : Staff Excellence Award, University of Newcastle, Australia.
- **2016** : CSIR-Young Scientist Award in Physical Sciences (including Instrumentation).
- **2015** : Scientific talk on All India Radio (AIR) about Solar Cell.
- **2013** : Indo-Australia early career research fellowship (INSA, New Delhi).
- **2006** : CSIR-Senior Research Fellowship.
- **2004** : CSIR-Junior Research Fellowship.
- **2003** : CSIR-UGC Lectureship Award.
- Others** : Some best poster presentation awards

### **Contributions to AcSIR**

2011 to 2017 : Assistant Professor, AcSIR-NPL  
 2017 to Till date : Associate Professor, AcSIR-NPL

**Teaching Course:** Advanced Electronic Materials and Semiconductor Devices

**Supervisor:** Supervising Ph.D. and M.Tech. students